

consistence. The liver, from its close approximation to the diaphragm, moves more during respiration than any other abdominal organ, and as it is a compact organ its lower edge moves as much as its upper surface. Any tumor which springs from the liver or is firmly attached to it must move as much as the liver itself. This is true, for example, of tumors of the stomach if they become attached to the liver, as frequently happens. This respiratory movement of the tumor may be misleading because the liver may communicate this motion to the freely movable tumor adjacent to it, although the two have no structural connection and are not adherent. Consequently a test suggested by Minkowski is more conclusive than the mere fact that a tumor moves with respiration. This test consists in holding back a tumor during respiration. If it is impossible to do so, the tumor may safely be concluded to be firmly attached to the liver. The other organs of the epigastrium, namely, the spleen and fundus of the stomach, are less moved by respiration than the liver. As the stomach is a hollow organ the motion of its upper portion is not communicated to the lower, and the pylorus moves scarcely at all. A kidney normally situated moves with respiration, but this can be observed only in slender persons with flabby abdominal walls. If such a person is examined bimanually, the lower pole of the kidney may be felt to sink during inspiration and to rise during expiration. If this motion can be plainly felt, enlargement of the kidney may be suspected. The pancreas and retroperitoneal tumors do not move with respiration. Organs and tumors of the mesogastrium and hypogastrium are unaffected by respiration unless they extend into these regions from above.

VALUE OF DISTENTION OF THE STOMACH AND INTESTINE FOR DIAGNOSTIC PURPOSES.—The stomach and intestine are displaced in certain definite directions if they are distended; and their distention displaces to a certain degree the surrounding organs. It may be stated as a general rule that a tumor of a neighboring organ as well as a neighboring organ which, though normal, is displaced, is moved back to its proper position by the distention of an adjacent hollow organ. If the tumor is very large or if it is adherent, the motion due to distention of the stomach or intestine will be slight or altogether wanting. If there is a tumor of the organ which is distended, the motion communicated to it will differ according to the seat of the tumor.

Tumors of the anterior wall of the stomach are made prominent by distention of this organ, while those of the posterior wall are obscured. Sometimes a tumor is increased in size by the distention. Sometimes its margin is made indefinite, even though it is a tumor of the anterior wall. This is especially true of superficial tumors, which are more plainly felt when the stomach is contracted. A tumor of the stomach which feels like a single mass may separate into several portions when the stomach is distended. Tumors of the pylorus and its vicinity are displaced usually to the right and downward. If situated higher up in the lesser curvature, they are displaced to the right side; and if situated near the cardia, they disappear altogether. This is

partly due to the rotation of the stomach, which brings the greater curvature forward.

When the intestine is dilated, all tumors of the stomach are displaced upward and are usually sharply differentiated from the distended transverse colon. This intestinal distention enables one to differentiate therefore between a tumor of the pylorus or greater curvature and one of the transverse colon.

The origin of a tumor of the large intestine is often plainly shown when the intestine is distended. Such a tumor cannot be differentiated from the intestine longitudinally, and in some cases the intestine will dilate only up to the tumor. A tumor of the transverse colon is often displaced downward by distention owing to the fact that the intestine is elongated. A tumor of the transverse colon is naturally displaced downward by distention of the stomach.

A tumor of the omentum is displaced downward by distention of the stomach as well as by distention of the intestine. Distention of the intestine usually brings the tumor nearer the abdominal wall.

Tumors of the small intestine are displaced downward by distention of the stomach if they are influenced at all thereby. They are surrounded by the large intestine, and when this is distended they may be crowded downward.

Tumors of the liver, including those of the gall-bladder, are displaced upward and to the right by distention of the stomach. They are also pressed more plainly against the anterior abdominal wall. Distention of the large intestine pushes them upward and at the same time makes the lower portion of the liver somewhat more plain.

Tumors of the spleen and wandering spleen are displaced to the left and somewhat downward by distention of the stomach, while they are displaced to the left and upward by distention of the large intestine. Palpation of the spleen is thereby facilitated. Distention of the stomach is most important in those cases in which dulness due to a normal or enlarged right lobe of the liver extends into the left hypochondrium, so that it is difficult to say whether this is due to liver or spleen. The distended stomach, by pressing between these organs, will separate the dulness caused by them.

Tumors of the kidney and wandering kidney are pressed backward by distention of the stomach, and are therefore obscured. If the tumor is small, the same result follows distention of the intestine; if the tumor is larger, distention of the intestine may make it more easily palpable bimanually, while the distended colon crosses over the kidney, whether right or left, in a characteristic manner.

A tumor of the pancreas as it grows usually presses between the stomach and transverse colon; therefore when either of these organs is distended the pancreatic tumor will be more or less covered. Sometimes the pancreatic tumor appears above the lesser curvature of the stomach or below the transverse colon. In rare cases it remains behind the stomach, lifting this organ forward as it grows. If the pancreatic tumor grows retroperitoneally toward the right or left

lumbar region, it simulates a renal tumor and is obscured by distention of the stomach or intestine.

**PASSIVE MOBILITY.**—The passive mobility of a tumor is demonstrated if the surgeon grasps it with one or both hands and attempts to move it in different directions. While this test has been applied since the earliest days of abdominal examination, it remained for Pagenstecher to make accurate tests of the mobility of various organs and tumors both in the living subject and upon the cadaver.

Every organ of the abdominal cavity has its own place to which it is more or less confined by its own attachments and the pressure of other organs. This is even true to a lesser degree of the coils of small intestine. In this respect a tumor behaves as the organ from which it grows, and a freely movable tumor has a tendency to remain in a certain situation which may be spoken of as its position of rest. Some tumors possess free passive mobility—that is, they can be moved about from the costal margin to the pelvis and from one side of the abdomen to the other. This is true of tumors of the small intestine and tumors of the mesentery if they are not situated too near the root of the mesentery, and tumors of the omentum if not too near the colon, and tumors of the ovaries or uterus which have a long pedicle. Sometimes a wandering spleen is thus freely movable, and in rare instances a wandering kidney or tumor of the pylorus. For these reasons free mobility of a tumor is not sufficient for a positive diagnosis. This is equally true of lack of mobility. Tumors of the pancreas, horseshoe kidney, retroperitoneal tumors, tumors springing from the remains of the urachus, vitello-intestinal duct, etc., cysts of the broad ligament, and inflammatory tumors which are adherent, as well as large tumors of the kidney, are usually immovable.

The determination of the area through which a tumor is movable has a certain diagnostic significance. Thus, if a tumor is pedicled and is not adherent, it will be movable through a larger or smaller circle. In most cases the attachment of the tumor is not limited to a single point; therefore the range of movement of the tumor is sometimes a circle, sometimes an oval, and sometimes a segment of a circle, etc. The centre of the area in which motion is possible represents the point of fixation, which may be the fixation of the organ in which the tumor is situated or the fixation of a pedicled tumor to some organ.

Different portions of the stomach possess different degrees of mobility, that of the pylorus being the greatest. The greater curvature is also very movable, but it is rarely the seat of a primary tumor. The area of mobility of tumors springing from these parts is usually a large circle or an oval. A tumor of the lesser curvature can be moved through a small oval similar to that of the gall-bladder though situated on the left side. A tumor of the fundus or the cardia may or may not appear below the border of the ribs. If so, this movement is limited to a slight up-and-down motion.

A tumor of the cæcum or ascending colon may be moved through an area which is arched toward the left side. The central point is rep-

resented by the fixation of the cæcum. A tumor of the descending or sigmoid colon may be moved through the corresponding area of the left side of the abdomen, but as the sigmoid mesocolon varies greatly in length, the mobility of a tumor of the sigmoid also varies. Sometimes a tumor of the transverse colon is freely movable, but in most cases there is a limit to its motion downward as well as toward either side. A tumor of the omentum is more movable the farther it is situated from the colon. The free mobility of the small intestine and mesentery has been mentioned. An enlarged gall-bladder partakes of the respiratory movement of the liver, but is otherwise not movable with the organ, rather in the opposite direction. The area of mobility may be an oval or a circle, or it may be confined to a line or a shallow arch in the frontal plane.

A wandering spleen is movable on the left side, and perhaps beyond the median line. If its degree of mobility is slight, it may be confounded with a wandering kidney. It can usually be recognized by its characteristic shape and its relation to the distended colon. It lies in front of the colon, while the kidney lies behind it.

The degree of mobility of a wandering kidney varies. Pagenstecher mentions three grades. A kidney of the first grade of mobility is palpable below the costal margin and can be pushed upward. A kidney of the second grade moves about its point of attachment, toward which the hilus is always directed. A kidney of the third grade of mobility can be displaced to the opposite side of the vertebral column. A tumor of the kidney usually displaces the organ downward, and if adhesions do not prevent it, may be pushed upward. In rare instances a tumor of the kidney possesses a greater degree of mobility.

The area of mobility of an ovarian tumor is often limited above by a shallow arch whose centre is situated in the true pelvis. Tumors which spring from the female pelvic organs when pressed upward by the hand upon the abdomen usually exert a distinct pull upon the cervix uteri which can be recognized by a finger in the vagina. This sign is wanting if the tumor has a long, slender pedicle.

A tumor of the abdominal wall can be moved about if the abdominal wall is relaxed. When its muscles are contracted, the tumor becomes fixed.

A tumor moves with changes in position of the body, usually sinking toward the lowest portion of the abdomen. Such movement is always less than the maximum passive motion. A foreign body in the stomach may be displaced from one portion to another of the organ by changes in the position of the patient. A wandering kidney often becomes more prominent when the patient lies upon the side or stands or kneels. A tumor of the true pelvis may fall forward and upward if the patient rests upon the knees and elbows or if the pelvis is elevated. These positions of the patient may also displace a vesical calculus from some hidden position to the vertex of the bladder, making it palpable externally or accessible to the sound.

The results of palpation of tumors of the abdomen, and especially

of the tests of their mobility, often depend upon the relaxation of the abdominal wall, and also upon the proximity of the tumor to the abdominal wall. It is therefore of advantage, as previously mentioned, to examine patients in different positions; such as the half-reclining position, with knees flexed and supported, or the knee-chest position, or with the pelvis elevated. The position of the patient should be such as to bring the organ in question as much as possible out of the hidden situation. In examining the lumbar region for suggested tumor of the kidney a patient should lie upon the sound side, while a sand-bag or firm cushion is placed beneath the unaffected loin. In this manner the ribs and ilium of the affected side are separated and the parts are rendered more accessible for examination. Examination of the epigastric and mesogastric regions is facilitated by a cushion placed beneath the lumbar vertebra while the patient lies in dorsal decubitus.

Relaxation of the abdominal muscles is facilitated if the patient breathes not too strongly with his mouth open. The surgeon should also distract the attention of the patient by conversation. Some surgeons anæsthetize a patient in order to relax the abdominal muscles, but Mikulicz has not done so for many years. There may be instances in gynecological practice in which the anæsthetic is desirable in order to spare the patient the pain and discomfort of an examination. In difficult cases an examination should be made while the patient is in a warm bath, since the abdominal muscles are greatly relaxed thereby.

The results of examination of abdominal tumors are much more striking if they are arranged in tabular form, or marked upon a diagram in different colors. The examination should show:

1. The condition of rest, the area in which pain is felt, the results of palpation, inspection, percussion, and the position of normal organs as well as that of the tumor.
2. Respiratory motions.
3. The limits of the greatest passive mobility of the tumor.
4. The results of distention of the stomach and intestine.

## CHAPTER XIII.

### MALFORMATIONS OF THE STOMACH AND INTESTINE.

#### CONGENITAL ANOMALIES OF THE STOMACH.

THE only malformation of the stomach which possesses surgical interest is pyloric stenosis. This may be slight or severe. Sometimes the stenosis is a true contraction of the orifice, and sometimes it is due to hypertrophy of the circular muscles. This hypertrophy may be so extreme that the wall of the pylorus measures 1 cm. (0.4 inch) in thickness, and the pylorus is palpable as a small tumor. This condition is quite different from complete atresia of the pylorus.

Neurath collected reports of 35 cases of congenital pyloric stenosis in which autopsy was performed. The symptoms appear either soon after birth or during the first year of life. They are similar to the symptoms produced by pyloric stenosis in later life except that the stomach does not have time to reach a high degree of dilatation before the child dies. There is intense vomiting of material which is free from bile, whereas ordinary infantile vomiting if severe is bilious. Sometimes peristaltic action of the stomach is visible, and sometimes a pyloric tumor may be felt. Under such circumstances the diagnosis is easily made. The passage of a stomach-tube will show that the motor function of the stomach is disturbed. There will be no hyperacidity as long as the child takes nothing but milk.

It is not possible to determine whether mechanical stenosis or muscular spasm exists. In the latter case internal treatment may be continued, but not too long, since so young a child sinks rapidly if the vomiting continues. The results of recent operations for this trouble are encouraging. Trautenroth collected reports of 12 cases treated by operation (1 pyloroplasty, 2 pyloric divulsions, and 9 gastro-enterostomies). Seven children survived operation.

There is another form of pyloric stenosis in which the symptoms are not manifest until some years after birth. Such stenosis may be a simple narrowing of the lumen of the bowel, or it may be of a hypertrophic character. In the present state of our knowledge it is impossible to say whether such stenosis is congenital or acquired.

There is also a congenital stenosis of the stomach itself (hour-glass stomach); or a transverse partition of the stomach may exist.

#### MECKEL'S DIVERTICULUM.

The commonest congenital anomaly of the intestine is known as Meckel's diverticulum. It is described as a form of, incomplete obliteration of the vitello-intestinal duct. (Page 139.) Meckel's diverticulum is found in about 2 per cent. of subjects, according to English